1) The capacity of a storage device is expressed as number of.
   (a) Byte   (b) Bits   (c) Character   (d) All these

2) A bit can be.
   (a) 1 or 0   (b) 1 and 0   (c) 1 only   (d) 0 only

3) The storing capacity of a computer is measured in.
   (a) Bit   (b) Byte   (c) Kilogram   (d) Gigabyte

4) Computes storage is basically divided into.
   (a) Ram & Rom   (b) Main memory & Secondary Storage
   (c) Main memory & Hard disk   (d) Floppy & Hard disk

5) Main memory is an extension of.
   (a) Ram   (b) Rom   (c) Hard disk   (d) Both a & b

6) Which memory provides very fast performance.
   (a) Cash memory   (b) Secondary memory
   (c) Random access memory   (d) Read only memory

7) If the memory of a computer is 32000 bytes. It means it can store how many characters.
   (a) 32   (b) 32000   (c) 64   (d) 2400

8) Which one of the following is referred to as volatile memory.
   (a) Read only memory   (b) Random access memory
   (c) Flash memory   (d) Cache memory

9) Generally RAM (random access memory) is measured in.
   (a) Bytes   (b) K bytes   (c) M bytes   (d) Both b and c

10) More RAM can make computer.
    (a) Expensive   (b) Run slower   (c) Run faster   (d) Powerful

11) RAM is called volatile memory because the data stored in it.
    (a) Do not disappear whenever the computer turns off
    (b) Disappear whenever the computer turns off.
    (c) CPU can directly access the RAM
    (d) It is very fast

12) A variation of ROM is.
    (a) Flash Memory   (b) Cache Memory
    (c) Programmable read only memory (PROM) (d) Direct access storage

13) We can search any item by simply specifying.
    (a) The hard disk tracks   (b) ROM size
    (c) Address in direct access storage   (d) None of the above

14) The surface of a hard disk is logically divided into.
    (a) Firmware   (b) SIMMs
    (c) Physically marking tracks   (d) Pie-shaped sectors

15) The number of sectors of a hard disk depends upon the.
    (a) Density of the hard disk   (b) Speed of the motor
    (c) Number of read/write head   (d) Capacity of RAM

16) Typically the storage capacity of a sector can be.
    (a) 512 bytes   (b) 512 kilobytes
    (c) Always 2 bits   (d) ½ the capacity of RAM.

17) The capacity of a hard disk depends upon the.
    (a) High speed motor   (b) Movement of read/write head
    (c) Complexity of software   (d) Number of disk platters

18) Computer storage is also referred as.
    (a) Computer device   (b) Computer RAM
    (c) Computer memory   (d) None of above
19) Main memory performance is.
    (a) Fast   (b) Slow   (c) Very fast   (d) None
20) Auxiliary storage provides.
    (a) Minimum capacity (b) Maximum capacity (c) Both a & b   (d) None
21) Computer memory is.
    (a) Mechanical File   (b) An electronic file (c) both of above   (d) None
22) "1" represents the data.
    (a) On   (b) Off   (c) both of above   (d) None
23) Each byte contains.
    (a) Information   (b) 1 Character   (c) both of above   (d) None
24) Computer storage is divided into classes.
    (a) Two   (b) Three   (c) Four   (d) Five
25) Main memory is directly accessible by.
    (a) CPU   (b) Printer   (c) Scanner   (d) Keyboard
26) The basic information unit is called a.
    (a) Character   (b) Word   (c) Nibble   (d) None
27) A word of 16 bits size can be called.
    (a) 4 Byte word   (b) 1 Byte word   (c) 2 Byte word   (d) 1 Nibble
28) 1 kilobyte equals
    (a) 2^{12} byte   (b) 2^{20} byte   (c) 2^{10} byte   (d) 2^{30} byte
29) The ROM has types.
    (a) Two   (b) Three   (c) PROM   (d) EPROM
30) When the power shuts off the contains are lost.
    (a) From ROM   (b) From RAM   (c) Both of above   (d) None
31) The most common RAM technologies are.
    (a) Two   (b) Three   (d) Four   (d) Five
32) The much more expensive and require more space and power is.
    (a) RAM   (b) SRAM   (c) DRAM   (d) ROM
33) The capacity of RAM effect the computer.
    (a) Size   (b) Length   (c) Power   (d) Life
34) DRAM needs to be refreshed
    (a) Periodically   (b) Hourly   (c) Weekly   (d) Yearly
35) DRAM is most commonly used technology to build
    (a) Software's   (b) Dynamic RAM   (c) RAM chips   (d) Static RAM
36) Which RAM is faster?
    (a) SRAM   (b) DRAM   (c) PRAM   (d) Both 'a' and 'b'
37) SRAM is known as the
    (a) Main memory   (b) Secondary memory (c) Cache memory   (d) None
38) MSB stands for
    (a) Microsoft significant byte   (b) Most significant byte
    (c) Microsoft significant bit   (d) Most significant bit

39) In EEPROM data is erased by
(a) Magnetically devices   (b) Electrical devices
(c) Electrochemical devices   (d) None

40) Which RAM is less expensive?
(a) SRAM   (b) DRAM   (c) PRAM   (d) Both 'a' and 'b'

41) Which disk is mostly used for transferring data
(a) Floppy disk   (b) Hard disk   (c) CD   (d) DVD

42) The most common size of floppy disk is
(a) 2.5"   (b) 3.5"   (c) 4.5"   (d) 5.5"

43) Floppy disk is encased in a rigid
(a) Aluminum case (b) Iron body   (c) Envelope   (d) Silicon case

44) A floppy disk is a storage medium
(a) Electric   (b) Electronic   (c) Chemical   (d) Magnetic

45) Floppy disks
(a) Are slower but less expressive   (b) Have less storage capacity
(c) Are portable   (d) All of these

46) Basic sizes of floppy disks are
(a) 8-inch   (b) 5 ¼ –inch   (c) 3 ½-inch   (d) All of these

47) Which size of floppy disk is most commonly used
(a) 8-inch   (b) 5 ¼ -inch   (c) 3 ½-inch   (d) 1 ¼ -inch

48) How many hard disks digital computers use
(a) One   (b) At most one (c) At least one   (d) None

49) Typically a track is divided into sectors
(a) 1   (b) 5   (c) 7   (d) 8

50) A sector usually contains a fixed number of bytes of data i.e.
(a) 256 bytes   (b) 512 bytes   (c) 28 bytes   (d) 1024-5ytes

ANSWER KEY

1	A	11	B	21	B	31	A	41	A
2	A	12	C	22	A	32	B	42	B
3	B	13	C	23	B	33	C	43	C
4	B	14	D	24	A	34	A	44	D
5	D	15	A	25	A	35	C	45	D
6	A	16	A	26	B	36	A	46	D
7	B	17	D	27	C	37	C	47	C
8	B	18	C	28	C	38	D	48	C
9	C	19	C	29	B	39	B	49	D
10	C	20	B	30	B	40	B	50	B

SHORT QUESTIONS

Q.1   **What is Main Memory?**

MAIN MEMROY

Main memory is most important part of computer used to store data and instructions that are currently is used. It is very fast but limited in capacity. A computer can not work without main memory.

Q.2   **What is RAM?**

RAM

RAM stands for random access memory. It is a primary storage device used to store the data and instructions temporarily. When the power is turned off, the instructions in RAM is lost. Thus it is called volatile memory.

Q.3   **What are the characteristics of RAM?**

CHARACTERISTICS OF RAM

Main characteristics of RAM are given below

1. The contents of the memory are lost when the electricity supply is cut off so the main memory is volatile.
2. CPU can read and write information from RAM, so it is called read write memory.
3. Any part of RAM can be directly accessed, so it called Random Access memory.
4. It has fast speed.

Q.4   **What is DRAM?**

DRAM

DRAM stands for Dynamic Random Access Memory. DRAM is the most commonly used technology to build RAM chips. In order to maintain data in DRAM chip, the chip is refreshed frequently, otherwise data may be lost. DRAM is slow in speed.

Q.5   **What is SRAM?**

SRAM

SRAM stands for Static Random Access Memory. SRAM is faster and expensive more than DRAM and it does not need to be refreshed. It is normally used to build a very fast memory known as cache memory.

Q.6   **What is cache memory?**

CACHE MEMORY

A cache is a small and very fast memory. It is designed to speed up the transfer of data and instructions. It is faster than RAM. The data and instructions that are most frequently used by CPU are stored in cache memory.

Q.7   **What is the difference between memory and storage?**

DIFFERENCE BETWEEN MEMORY AND STORAGE

MEMORY	STORAGE
1. Memory is volatile	1. Storage is non volatile.
2. It is faster than storage.	2. It is slower than memory
3. It is more expensive than storage	3. It is less expensive then memory.
4. It has small storage capacity.	4. It is more storage capacity.

Q.8   **What is the difference between SRAM and DRAM?**

DIFFERENCE BETWEEN SRAM AND DRAM

SRAM	DRAM
1. It is faster than DRAM	1. It is slower than SRAM
2. It is more expensive	2. It is less expensive.
3. It does not need to be refreshed	3. It need to be refreshed.
4. It consume less power.	4. It consume more power.

Q.9   **What is ROM?**

ROM

ROM stands for Read Only Memory. The manufacturer of ROM writes the data and program permanently into it and this data and program can not be changed. So it is called read only memory. ROM is also called non volatile memory because when the power is switched off, the instructions stored in ROM are not lost.

Q.10   **What is PROM?**

PROM

PROM stands for Programmable Read Only Memory. It is initially blank chip and the user can write his own data and program on it by using special devices. Once a instructions are written on it can not be changed or altered.

Q.11   **What is EPROM?**

EPROM

EPROM stands for Erasable Programmable Read Only Memory. It is initially blank chip and the user can write his own data and program on it by using special devices. Unlike PROM, a user can changed or altered the data by using ultraviolet rays.

Q.12   **What is EEPROM?**

EEPROM

EEPROM stands for Electronically Erasable Programmable Read Only Memory. In this memory, user can erased and write instructions with the help of electrical pulses. The contents of EEPROM can be modified easily.

Q.13   **What is the difference between primary and secondary   memory?**

DIFFERENCE BETWEEN PRIMARY AND SECONDARY MEMORY

PRIMARY MEMORY	SECONDARY MEMORY
1. It is expensive	1. It is cheap.
2. It has small capacity	2. It has large capacity.
3. It directly connected to the processor.	3. It does not directly connected to the processor.
4. It is fast in Access	4. It is slow in Access.

Q.14   **What is the difference between Ram and Rom?**

DIFFERENCE BETWEEN RAM AND ROM

RAM	ROM
1. RAM is a temporary memory.	1. ROM is permanent memory.
2. The data in RAM can be changed or deleted.	2. The instructions written in ROM can not be changed or deleted.
3. RAM is a volatile	3. ROM is a non volatile
4. The instructions are written into the RAM at the time of execution.	4. The instructions are written into the ROM at the time of manufacturing.

Q.15 What is the difference between PROM and EPROM?

DIFFERENCE BETWEEN PROM AND EPROM

PROM	EPROM
1. PROM is a programmable memory.	1. EPROM is electrically programmable memory.
2. The user can write instructions on PROM only once	2. The user can write instructions on EPROM many times.
3. The instructions written by the user cannot be erased from PROM	3. The instructions written by the user can be erase from EPROM
4. If there is an any error while writing on PROM, it becomes unusable.	4. If there is an error while writing on EPROM it can still be used again

Q.16 What is memory measuring chart?

Following is a list of memory measuring units.

1 Nibble   = 4 bits
1 Byte   = 8 bits
1 KB (Kilo Bytes) = 1024 bytes = 2^{10} bytes
1 MB(Mega Byte) = 1024 KB   = 2^{20} bytes
1 GB (Giga Byte) = 1024 bytes = 2^{30} bytes
1 TB (Terabyte)   = 1024 bytes = 2^{40} bytes

Q.17 What is secondary memory?

SECONDARY MEMROY

Secondary memory is also called permanent memory or auxiliary memory. It is inexpensive, slow in speed and large storage capacity as compared to primary memory. The storage capacity in GB. Secondary storage devices are also used for backup of data.

Q.18 What is floppy disk?

FLOPPY DISK

Floppy means soft. Floppy disk is also called diskette. A floppy disk is made of flexible plastic, which is coated with magnetic oxide. A floppy disk is enclosed in plastic jacket. It is mostly used for transferring data between computers and backup of data. It has low capacity, and is very slow as compared to other storage devices. Floppy disks come in different sizes but today the most common size is 3.5 inches diameter.

Q.19 What is Hard disk?

HARD DISK

Hard disk is also called fixed disk. It is a permanent storage device. A hard disk is made up of more than one metal platter with magnetic coating on both sides. Each platter is coated with iron oxide.

Q.20 What is Data rate?

DATA RATE

The data rate is the number of bytes per second that the drive can read and delivers to the CPU. The data rate of hard disk is normally between 5 to 40 megabytes per second.

Q.21 What is Seek Time?

SEEK TIME

The time is used to move the head to the appropriate track after reading the address is called seek time.

Q.22   What is Rotational Delay?

ROTATIONAL DELAY

When the head reaches the required track, the read/write head has to wait for some time so that the required sector comes under it due to the rotation of the platter. This delay is called Rotational delay.

Q.23   What is Transfer Delay?

TRANSFER DELAY

When the appropriate sector comes under the read/write head, it reads the data from the disk and sends this data to the processor. The time consumed in this process is called the transfer delay.

Q.24   What is the difference between FLOPPY disk and Hard disk?

DIFFERENCE BETWEEN FLOPY AND HARD DISK

FLOPY DISK	HARD DISK
1. Floppy disk contains a single piece of plate.	1. Hard disk contains one or more metal plates.
2. It is small and portable.	2. It is usually fixed and not portable.
3. It is less expensive	3. It is expensive.
4. It can store small amount of data	4. It can store large amount of data.
5. The storage capacity in MB.	5. The storage capacity in GB.
6. Data access speed is slow	6. Data access speed is fast
7. It is unreliable storage media	7. It is reliable storage media
8. It can be damaged easily due to dust and heat.	8. It cannot be damaged easily due to dust and heat.

Q.25   What is low level formatting?

LOW LEVEL FORMATTING

In low-level formatting, a drive marks the tracks and sectors on the disk. Usually this is done by the manufacturer of the disk. In this process the starting and ending points of each sector are written onto the disk/platter. This process prepares the disk to hold data.

Q.26   What is high level formatting?

HIGH LEVEL FORMATTING

In high-level formatting, the information about file-storage is written onto the disk called file-allocation table (FAT). It means the file allocation table is created on the disk. This process also prepares the disk to hold data.

Q.27   What is compact disk?

COMPACT DISK

The most widely used storage devices are the optical storage devices. The most prominent optical storage system is compact disk (CD). These disks are approximately 5 inches in diameter and consist of reflective material. The media which is used to store information on a CD is LASER. The storage capacity of CD is more than 700 MB.

Q.28   What is magnetic tape?

MAGNETIC TAPE

Magnetic tape is the most popular and oldest secondary storage used to store large amount of data and instructions permanently. The magnetic tape is a plastic ribbon and one side coated with magnetic recording material.

LONG Q.UESTIONS

Q.1   Write a detail note on main memory?

MAIN MEMORY

Main memory is most important part of computer used to store data and instructions that are currently is used. It is very fast but limited in capacity. A computer can not work without main memory.

TYPES OF MAIN MEMROY

There are two types of main memory
1. RAM
2. ROM

1-   RAM (RANDOM ACCESS MEMROY)

RAM stands for random access memory. It is a primary storage device used to store the data and instructions temporarily. When the power is turned off, the instructions in RAM are lost. Thus it is called volatile memory.

OPERATIONS ON RAM

CPU can perform two types of operations on RAM these are

- Read Operation
- Write Operation

- **READ OPERATION**

During read operation the contents of memory location are copied to a CPU register.

- **WRITE OPERATION**

During write operation the contents of CPU register are copied to the memory locations.

\TYPES OF RAM

RAM is usually built by using two different technologies. These are
1. DRAM
2. SRAM

1.   DRAM (DYNAMIC RANDOM ACCESS MEMORY)

DRAM stands for Dynamic Random Access Memory. DRAM is the most commonly used technology to build RAM chips. In order to maintain data in DRAM chip, the chip is refreshed frequently, otherwise data may be lost. DRAM is slow in speed.

2.   SRAM (STATIC RANDOM ACCESS MEMORY)

SRAM stands for Static Random Access Memory. SRAM is faster and expensive more than DRAM and it does not need to be refreshed. It is normally used to build a very fast memory known as cache memory.

CACHE MEMORY

A cache is a small and very fast memory. It is designed to speed up the transfer of data and instructions. It is faster than RAM. The data and instructions that are most frequently used by CPU are stored in cache memory.

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3. Any part of RAM can be directly accessed, so it called Random Access memory.
4. It has fast speed.

2- ROM (READ ONLY MEMORY)

ROM stands for Read Only Memory. The manufacturer of ROM writes the data and program permanently into it and this data and program can not be changed. So it is called read only memory. ROM is also called non volatile memory because when the power is switched off, the instructions stored in ROM are not lost.

CHARACTERISTICS OF ROM

Main characteristics of ROM are given below

1. We can only read from Rom.
2. We cannot write or delete information from ROM.
3. This memory is also called non-volatile.
4. This memory is also called firmware.
5. Computer uses ROM at the time of booting (start).

TYPES OF ROM

ROM is further divided into the following categories

1. PROM
2. EPROM
3. EEPROM

1- PROM (PROGRAMABLE READ ONLY MEMORY)

PROM stands for Programmable Read Only Memory. It is initially blank chip and the user can write his own data and program on it by using special devices. Once a instructions are written on it can not be changed or altered.

2- EPROM (Erasable Programmable Read Only Memory)

EPROM stands for Erasable Programmable Read Only Memory. It is initially blank chip and the user can write his/her own data and program on it by using special devices. Unlike PROM, a user can changed or altered the data by using ultraviolet rays.

3- EEPROM
(Electrically Erasable Programmable Read Only Memory)

EEPROM stands for Electronically Erasable Programmable Read Only Memory. In this memory, user can erased and write instructions with the help of electrical pulses. The contents of EEPROM can be modified easily.

It can be very useful for taking backup of data and for keeping record that are updated periodically.

Q.2 Write a note on RAM?

RAM (RANDOM ACCESS MEMROY)

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ROM stands for Read Only Memory. The manufacturer of ROM writes the data and program permanently into it and this data and program can not be changed. So it is called read only memory. ROM is also called non volatile memory because when the power is switched off, the instructions stored in ROM are not lost.

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2- **EPROM (Erasable Programmable Read Only Memory)**
EPROM stands for Erasable Programmable Read Only Memory. It is initially blank chip and the user can write his/her own data and program on it by using special devices. Unlike PROM, a user can changed or altered the data by using ultraviolet rays.

3- **EEPROM**
(Electrically Erasable Programmable Read Only Memory)
EEPROM stands for Electronically Erasable Programmable Read Only Memory. In this memory, user can erased and write instructions with the help of electrical pulses. The contents of EEPROM can be modified easily.
It can be very useful for taking backup of data and for keeping record that are updated periodically.

Q.4 **Briefly explain Floppy Disk.**

FLOPPY DISK

Floppy means soft. Floppy disk is also called diskette. Floppy disks are commonly used as secondary storage and backup memory devices. Floppy disks come in different sizes but today the most common size is 3.5 inches diameter. It has low capacity, and is very slow as compared to other storage devices.

STRUCTURE OF FLOPPY DISK
A floppy disk is made of flexible plastic, which is coated with magnetic oxide. A floppy disk is enclosed in plastic jacket.

USES OF FLOPPY DISK
Floppies are used to transfer small amount of data from one computer to another computer.

PROPERTIES OF FLOPPY DISK
1. Floppy disks are very cheap as compared to other storage devices.
2. It is not a reliable storage medium.
3. We can not store large amount of data on a floppy disk.
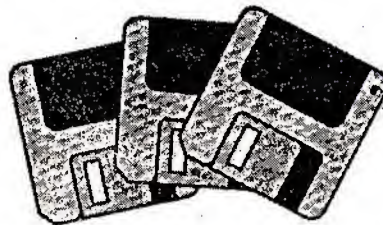4. It is easily portable.
5. It is slower than hard disk

TYPES OF FLOPPY DISK
Floppies are divided according to
1. Size
2. Storage capacity

ACCORDING TO SIZE
1. 8 Inch
2. 5.25 Inch
3. 3.5 Inch

ACCORDING TO STORAGE CAPACITY

According to capacity, there are four types

5.25'' Floppy Disk with double density	360 KB
5.25'' Floppy Disk with high density	1.2 MB
3.5'' Floppy Disk with double density	720 KB
3.5'' Floppy Disk with high density	1.44 MB

ACTION TAKING ON THE DISK

The following is the series of actions taking place when data is written on the disk

1. The computer program passes an instruction to the computer hardware to write data file on a floppy disk
2. The computer hardware and the floppy-disk-drive controller start the motor in the diskette drive to spin the floppy disk.
3. A second motor, called a stepper motor, rotates a worm-gear shaft in minute that match the spacing between tracks.
4. The read/write heads stop at the track. The read head checks the prewritten address on the formatted diskette to be sure it is using the correct side of the diskette and is at the proper track.
5. Then the data is written to the required address.
6. The diskette stops spinning. The floppy disk drive waits for the next command.
7. On a typical floppy disk drive, the small indicator light stays on during all of the above operations.

Q.5   **Briefly explain Hard Disk.**

HARD DISK

Hard disk is also called fixed. It is permanently fixed within the system unit. It is because hard disk is also referred to as fixed disk. Most digital computers use at least one hard disk drive. Some large scale computers normally contain more than one hard disk. Hard disks are used to store data permanently.

A typical hard disk consists of a sealed metallic box with controller circuit on one side. The hard disk controller is responsible for retrieving/storing data on the hard disk. A hard disk with its heads and platters is shown in the figure below.

The data storage part of the hard disk consists of one or more metallic circular platters. Each platter is coated with magnetic recording material on both sides. It is important to note that both sides of the platter have their own lead/write heads. The hard disk controller uses these heads to store and retrieve data to and from the disk. By arranging data on multiple platters the performance of the hard disk increases.

Capacity and Performance of Hard Disk

Nowadays, a typical desktop computer has a hard disk with a storage capacity of more than 80 gigabytes (GB).

Data is stored onto the disk in the form of files. A file is simply a named collection of bytes. The files may be of data files or programs files.

Hard disk is very fast in accessing data as compare to other storage devices, There are two ways to measure the performance of a hard disk. These are described below.

i) **Data Rate**

The data rate is the number of bytes per second that the drive can read and delivers to the CPU. The data rate of hard disk is normally between 5 and 40 megabytes per second.

ii) **Seek Time**

The time used to move the head to the appropriate track after reading the address is called the seek time.

CHARACTERISTICS OF HARD DISK

1. Hard disk provides large storage capacity. The capacity of computer hard disk is from 2 to 80 GB and more.
2. It is much faster than floppy disk.
3. It is the secondary media for storing data and program.
4. It is more reliable than floppy disk.
5. Data stored on hard disk is safer than floppy disk.

Data Organization

The disk is formatted through operating system before to store data on it. The operating system divides the disk into different circles called tracks. Each track is further divided into pie-shape area called sectors. Typically a track is divided into 8 sectors. The information is stored into sectors. In one sector, 512 bytes are stored. The disk with logical tracks & sectors is shown in figure below.

When data is to be retrieved from the hard disk, the operating system of the computer usually reads the whole track into the memory even if only one byte is needed. This increases the performance of the computer system.

We know that a hard disk have more than one platter and each platter have two surfaces. The tracks on a surface are numbered from 0,1, 2.........n. All the tracks on the disk with same track number make up a cylinder.

It is important to note that the position of tracks and sectors are not fixed but these positions are marked during the formatting process of operating system.

Tracks

Sectors

Q.6 How data is stored and retrieved from the Hard Disk?

STORING AND RETRIEVING DATA FROM THE HARD DISK

Data is organized on the disk into tracks and sectors. Each track has a unique number. First track always has the number 000. Similarly sectors on a track are numbered. When operating system of the computer wants to read some data on some part of the disk, it specifies the address of the location and provides the data. By using the provided address, the disk controller moves the read/write heads to the required track. It also uses the motor in the disk drive to rotate the disk platter. Because of this mechanical component, this process is very slow as compared to the speed of the processor. When the head reaches at the required track, the read/write head has to wait for some time so that the required sector comes under it due to the rotation of the platters. This delay is called the **Rotational Delay.** When the appropriate sector comes under the read/write head, it reads the data from the disk and sends this data to the processor. The time consumed in this process is called the **Transfer Delay.** So the access timer calculated as

Access time = Seek time + Rotational Delay + Transfer Delay

Q.7 Write a note on Compact Disk?

COMPACT DISK

CD stands for compact disk. It is another new technology storage media, which is very mud popular nowadays. This memory allows us only to read and write data on it. The media, which is used to store information on a CD, is LASER, where LASER stands for Light amplification by stimulated emission of radiation. In a CD-Rom we can store more than 700 MB data. The device which is used to read from a compact disc is called CD-Drive.

These disks are approximately 5 inches in diameter and consist of reflective material covered with a clear protective coating. Information is recorded on them by creating variations in their reflective surfaces. The information can then be retrieved by detecting these variations with a laser beam. Information on a CD us stored on one continuous track spirals around the CD like a groove in an old fashioned record. This is different from the magnetic disks where data is stored in concentric tracks.

Properties of a Compact Disk

1. It provides big storage capacity.
2. The storage cost is extremely low.
3. The access time of data is relatively fast.
4. One small inexpensive disk will be able to replace 25 to 30 reels of magnetic tape and a data on the disk can be accessed with in a few milliseconds.
5. An optical disk is a permanent storage device.
6. Once data recorded, cannot be erased and hence the disk cannot be reused.
7. Erasable and rewrite able optical disks now also available in market but these disks required special devices to write and erase data.

Uses of a Compact Disk

Vast amount of data can be stored on an optical disk. Due to this its use is increasing day by day. It is used to store following types of information.

1. Back up of data
2. Image processing
3. Geological survey data
4. Medical publishing indexes
5. Historical information files
6. Software development and installation
7. Listening music and watching movies
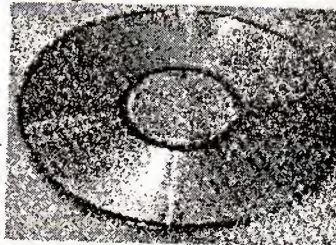
Advantages

- It is the least expensive way to store large amounts of data and information.
- CD disks are durable and easy to handle.
- Information can be stored on CD for many years.

Disadvantages
- It retrieves data and information more slowly than magnetic disks.

Q.8   Write a note on magnetic tape?

MAGNETIC TAPE

Magnetic tape is one of the most popular storage medium for storing large data where you want to access data sequentially. The magnetic tape is a plastic ribbon usually ½ inch wide that is coated on one side with an iron-oxide material which can be magnetized. The tape ribbon itself is stored in reels of 50 to 2400 feet or a small cartridge or cassette. It is similar to the tape used on a tape recorder except that it is a higher quality and more durable. Like recorder tape, computer tape can be erased and reused again arid again. Old data on a tape is automatically erased as new data is recorded in the same area.

DATA ORGANIZATION ON MAGNETIC TAPE

Like magnetic disk, magnetic tape is also formatted before to store data on it The tape is divided into segments or frames, each of which is magnetically marked. Each frame is further divided into horizontal rows called tracks (or channels). Each frame represents one character and each track of frame stores one bit for the code of character. Typically, a frame is divided into 9 tracks, The first 8 racks are used for recording the code of specific character and ninth track is used or recording the parity bit or check bit. The parity bit is used to detect any errors in the data stored on the tape. If this bit is set to '1' or '0', so that the total number of Is in the frame is even. This method of detecting error is called even parity. We can similarly define odd parity. The inter block gaps are also marked, so that the tape can stop without skipping any data and can be moved before reading data.

Data stored a magnetic tape can be accessed only sequentially. This is the main disadvantage of tape storage because moving between different positions on a can be very time-consuming. The tape systems are nor popular for data storage. On the other hand these tape devices are very cheep as compared to the magnetic disk. A large volume of data can be stored on the tapes for backup purposes. So these are used mainly in backup storage applications.
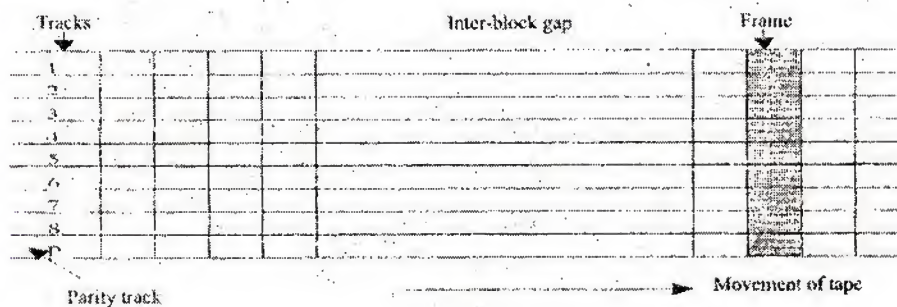
Advantages of Magnetic Tape

1.   Unlimited Storage

The storage capacity of a magnetic tape is virtually unlimited because we can use as many tapes as required for recording our data.

2.   Low cost

Magnetic tape is a very low cost storage media.

3. **Portability**

A reel of tape is also a convenient way of carrying information from one place to another. It is often used for transferring data and programs from one computer to another, which are not linked together. Limitations of Magnetic Tape

4. **No Direct Access**

Data from a magnetic tape cannot be accessed directly. Data is accessed sequentially, so if a data item is at the end of a tape, all the earlier parts to be read before accessing the required information.

5. **Slow**

Magnetic tape is sequential that is why it is slow storage medium and data reading speed is slow.

6. **Environment problems**

Dust, uncontrolled humidity or temperature levels can cause tape-reading errors. Magnetic tape require dust free environment.

EXERCISE

Q.1 **Describe in detail the purpose and working of the main memory.**

Main Memory

The main memory is most important part of computer used to store data and instructions that are currently in use. A program to be executed is first loaded in the computer memory and then instructions are executed one by one by the CPU. The data and results of calculations are also stored in the memory. In this sense main memory is the working area of the computer. It is very fast but limited in storage capacity. A computer cannot work without having main memory.

The main memory of a computer consists of thousand or even millions of cells each capable of storing a bit, i.e. 0 or 1. These cells are logically organized into group of 8 bits (Binary digits) called a byte. A figure is given below, which shows memory cells organized as a byte.

0	1	0	1	0	1	1	0

Each byte in the memory has a unique number assigned to it. This number is called the address of that byte. This scheme of arranging cells into a byte .and bytes into memory chip is shown in figure. The numbers show the byte number assigned to the byte and is also called its address.

0000	0001	0002	0003	....
....	....	....	....	....
....	....	....	....	....

Actually, the main memory of a computer is a collection of bytes arranged an order or sequence. CPU or any other component of the computer can access any byte from the main memory by specifying its address. Different bytes of the main memory can be accessed directly or randomly. It is because the main memory called direct access storage device. It is very fast to access data as compared to other storage devices like the magnetic and optical disks. Most computers have the following two types of main memory
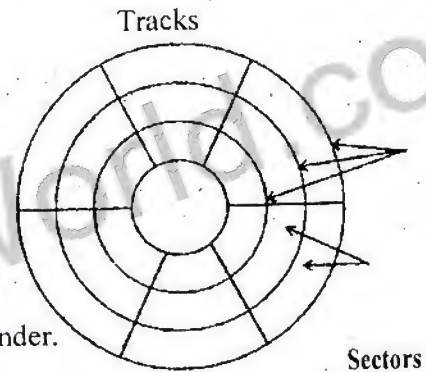
1. RAM
2. ROM

Q.2 Describe in detail the purpose and working of the following storage devices.
   (a) Floppy Disk   (SEE Q. #4 Page # 97)
   (b) Hard Disk   (SEE Q. #5 Page # 99)

Q.3 Describe in detail the purpose and working of the following backing storage devices.
   (c) Compact Disk   (SEE Q. #7 Page # 102)
   (d) Magnetic Tape   (SEE Q. #8 Page # 104)

Q.4 Explain using a labeled diagram, the concept of track and sector when describing magnetic disk storage.

Data Organization

The disk is formatted through operating system before to store data on it. The operating system divides the disk into different circles called tracks. Each track is further divided into pie-shape area called sectors. Typically a track is divided into 8 sectors. The information is stored into sectors. In one sector, 512 bytes are stored. The disk with logical tracks & sectors is shown in figure below.

When data is to be retrieved from the hard disk, the operating system of the computer usually reads the whole track into the memory even if only one byte is needed. This increases the performance of the computer system.

We know that a hard disk have more than one platter and each platter have two surfaces. The tracks on a surface are numbered from 0,1, 2..........n. All the tracks on the disk with same track number make up a cylinder.


It is important to note that the position of tracks and sectors are not fixed but these positions are marked during the formatting process of operating system.

Q.5 Explain the purpose of the following and draw a diagram showing their relationship.
   a. Cache Memory
   b. Hard Disk
   c. Magnetic Disk

CACHE MEMROY

A cache is a small and very fast memory. It is used between CPU and the main memory. It increases the performance of a computer. The data and instructions that are most recently used by the CPU are stored in cache memory. This memory arrangement is shown in figure below.
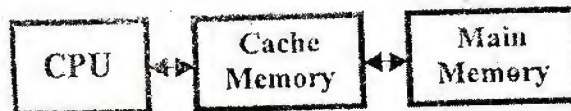
HARD DISK   (SEE Q. #5 Page # 99)
MAGNETIC DISK   (SEE Q. #8 Page # 104)

Q.6 Explain why secondary memory is needed in computer system.

Primary memory is directly accessible to the processor and is used to store data and programs that are in current use. The control unit does not have direct access to data that is stored anywhere outside the processor or main memory. However, this storage is limited in size and volatile. We need some storage device that is not temporary in nature and that does not have the same restrictions of size as that of main memory. Such a device is called secondary storage device or secondary memory. Secondary memory devices are categorized according to the following

- means by which the data is stored, optically or magnetically
- The technique used for storage of the data, sequential storage or direct access storage
- The capacity of the medium, how much can be stored on it
- Portability of the medium, can it be moves around easily
- Access times to the data stored
  Secondary storage is required to permanently store information that is not needed in memory all of the time and which may be too large to fit into the memory of the computer.

Q.7 Explain the purpose of the following
  a. Low level formatting
  b. High level formatting
  c. RAM and ROM

LOW LEVEL FORMATTING

In low-level formatting, a drive marks the tracks and sectors on the disk. Usually this is done by the manufacturer of the disk. In this process the starting and ending points of each sector are written onto the disk/platter. This process prepares the disk to hold data.

HIGH LEVEL FORMATTING

In high-level formatting, the information about file-storage is written onto the disk called file-allocation table (FAT). It means the file allocation table is created on the disk. This process also prepares the disk to hold data.

RAM and ROM

RAM

RAM stands for random access memory. It is a primary storage device used to store the data and instructions temporarily. When the power is turned off, the instructions in RAM are lost. Thus it is called volatile memory.

ROM

ROM stands for Read Only Memory. The manufacturer of ROM writes the data and program permanently into it and this data and program can not be changed. So it is called read only memory. ROM is also called non volatile memory because when the power is switched off, the instructions stored in ROM are not lost.

Q.8 A 9th class student has a home computer system. What storage devices, the student will use on the home computer system. Explain why these devices are needed?

A 9th class student has the following storage devices in his home computer.

FLOPPY DISK

It is needed to make the casual backup of important data. I also share data and program files with my friends through floppy disk.

CD-ROM

It is needed to install new software that are mostly available on the CDs. I also watch movies through this device.

HARD DISK

It is very important storage device. Windows operating system is required hard disk into the PCs. All the application programs are installed on the hard disk.

Q.9 Fill in the blanks

i) Hard Disk   ii) Magnetic Tape   iii) Seek , Latency

iv) Random Access Memory   v) 20^{20} vi) DRAM   vi) DRAM

vii) Seek Time   viii) Higher   ix) Erasable Programmable Read Only Memory

x] Most Significant Bit

Q.10 Match the following.

Hard disk	Secondary storage
RAM	Primary storage
Tape storage	Serial access
CD	Optical storage

Q.11 Choose the correct answer

i) a   ii) b   iii) d   iv) a   v) e

Q.12 Mark the following as True or False

i) F   ii) F   iii) T   iv) T   v) T   vi) F   vii) T   viii) T ix) F